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(71)Applicant : A W NEW HARD:KK

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(72)Inventor : KAMIYA KAZUO

NAKAGAWA YOSHIHIRO

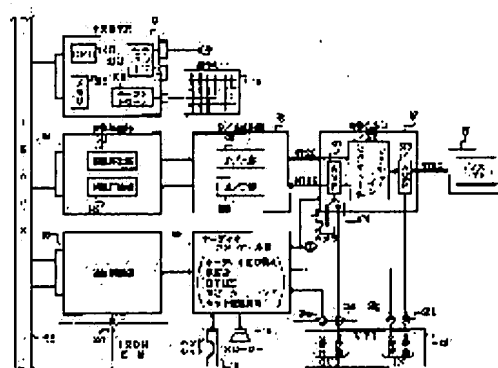
KUBOTA TOMOKI

(54) VIDEO TELEPHONE

(57)Abstract:

PURPOSE: To enable a speaker to set up picture quality and to display a moving image having natural motion on a screen.

CONSTITUTION: A CPU 311 enters data for one frame from an original image stored in a block memory in an image compressing part 342 in accordance with a parameter stored in a set parameter storing part and judges compression data size. When the compression data size is less than 1K bytes, an image with less movement is judged and respective parameters are changed in a direction for improving picture quality (direction approaching the original image). When the compression data size is increased and exceeds 2K bytes, an image with much movement is judged and respective parameters are changed in a direction for deteriorating the picture quality. When the data size is 1K to 2K bytes, image compression is executed by the image compressing part 342 by means of current parameters.



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CLAIMS

[Claim(s)]

[Claim 1] In the TV phone which has the camera which photos an image, and the display which displays an image, compresses image data, and is transmitted and received with voice data A conversion means to change the video signal of an analog into digital image data, A parameter setup means to set up the parameter which incorporates data from the subject-copy image data after the conversion in this conversion means, A parameter storage means to memorize the parameter set up with this parameter setup means, A data taking-in means to incorporate data from subject-copy image data according to the parameter memorized by this parameter storage means, The TV phone characterized by providing a compression processing means to compress the image data incorporated with this data taking-in means, and a transmitting means to transmit the image data compressed with this compression processing means.

[Claim 2] In the TV phone which has the camera which photos an image, and the display which displays an image, compresses image data, and is transmitted and received with voice data A conversion means to change the video signal of an analog into digital image data, A parameter setup means to set up the parameter which incorporates predetermined data from the subject-copy image data after the conversion in this conversion means, A parameter storage means to memorize the parameter set up with this parameter setup means, A data taking-in means to incorporate data from subject-copy image data according to the parameter memorized by this parameter storage means, A compression processing means to compress the image data incorporated with this data taking-in means, A transmitting means to transmit the image data compressed with this compression processing means, and an amount-of-data detection means to detect the amount of compressed data of the image data compressed with said compression means, Said parameter is changed so that image quality may be lowered, when the amount of compressed data detected with this amount-of-data detection means is larger than a predetermined value. The TV phone characterized by providing a parameter modification means to change said parameter so that image quality may be raised, when the amount of compressed data is smaller than a predetermined value.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to a TV phone and relates to the TV phone which carries out a screen display of the animation of a natural motion to a detail.

[0002]

[Description of the Prior Art] Development of the TV phone using ISDN is performed with the spread of ISDN (service synthesis digital communication network). This TV phone also combines images, such as a message person's self-portrait, and data, and enables it to communicate in addition to the conventional telephone which communicates only voice. While encoding the voice inputted from the hand set, he carries out compression coding of a speaker's image picturized with the camera equipped with CCD (Charge coupled device) etc., and is trying to transmit both from an ISDN circuit through the ISDN communications control section in such a TV phone. On the other hand, the voice and the image from the other party speaker also output the decrypted image to a display, while decrypting these and outputting voice from a hand set, since it is encoded and transmitted.

[0003] Here, the amount of data which can transmit has a limit using an ISDN circuit, and it has become 64K bits per second in current. For this reason, in the current TV phone, although it is an animation, image quality of the image to transmit is made into the value set up by each manufacturer corresponding to the special feature of an eye, opening, and the image that the location of face last time moves somewhat. And after considering as setting image quality by thinning out of the data which picturized by CCD so that it might become the set-up image quality, or were picturized by CCD etc. and compressing as opposed to the image data by the various data compression approaches, such as DCT (discret cosine transform; discrete cosine transform) and Huffman coding, it has transmitted to the message partner through an ISDN circuit with voice data.

[0004]

[Problem(s) to be Solved by the Invention] However, in the conventional TV phone, as described above, the image quality to transmit is set as constant value. For this reason, image quality was made into the sacrifice, when it was going to show, for example against fixed images, such as a drawing, or when talking in the condition with comparatively few motions. When an intense motion copied out, in order that the amount of data might increase and the frame number which can be transmitted might decrease on the other hand, it changed into a condition like coma delivery, and the motion was made into the sacrifice. Thus, in the conventional TV phone, since the amount of data which can transmit was restricted, image quality or a motion had fallen victim. Then, this invention sets it as the 1st purpose to offer a TV phone with a speaker able to set up image quality. Moreover, this invention sets it as the 2nd purpose to offer the TV phone which can carry out a screen display of the animation of a natural motion.

[0005]

[Means for Solving the Problem] In the camera which photos an image in invention according to claim 1, and the TV phone which have the display which displays an image, compress image data, and are

transmitted and received with voice data A conversion means to change the video signal of an analog into digital image data, A parameter setup means to set up the parameter which incorporates data from the subject-copy image data after the conversion in this conversion means, A parameter storage means to memorize the parameter set up with this parameter setup means, A data taking-in means to incorporate data from subject-copy image data according to the parameter memorized by this parameter storage means, A TV phone is made to possess a compression processing means to compress the image data incorporated with this data taking-in means, and a transmitting means to transmit the image data compressed with this compression processing means, and said 1st purpose is attained. In the camera which photos an image in invention according to claim 2, and the TV phone which have the display which displays an image, compress image data, and are transmitted and received with voice data A conversion means to change the video signal of an analog into digital image data, A parameter setup means to set up the parameter which incorporates predetermined data from the subject-copy image data after the conversion in this conversion means, A parameter storage means to memorize the parameter set up with this parameter setup means, A data taking-in means to incorporate data from subject-copy image data according to the parameter memorized by this parameter storage means, A compression processing means to compress the image data incorporated with this data taking-in means, A transmitting means to transmit the image data compressed with this compression processing means, and an amount-of-data detection means to detect the amount of compressed data of the image data compressed with said compression means, Said parameter is changed so that image quality may be lowered, when the amount of compressed data detected with this amount-of-data detection means is larger than a predetermined value. When the amount of compressed data is smaller than a predetermined value, a TV phone is made to possess a parameter modification means to change said parameter so that image quality may be raised, and said 2nd purpose is attained.

[0006]

[Function] In invention according to claim 1, the parameter is set up displaying image data, such as a self-portrait photoed with the camera, on a display, and looking at the displayed image, and a speaker sets up and changes the image quality transmitted to a message partner. A parameter storage means is made to memorize the set-up parameter. And compression processing of the data incorporated from subject-copy image data according to the set-up parameter is carried out, and it transmits to the other party TV phone. In invention according to claim 2, further, a motion of image data is judged by the compression image amount of data, and the parameter which incorporates image data is changed so that it may become the suitable image quality according to a motion. That is, when there are few fixed images and motions, image quality is set up highly, and a natural motion is projected by making [many] the frame number which lowers image quality in the case of the large image of a motion, and is transmitted.

[0007]

[Example] Hereafter, one example in the TV phone of this invention is explained to a detail with reference to drawing 1 thru/or drawing 11. Drawing 1 expresses the appearance configuration of a TV phone. it is [be shown in this drawing 1] alike, and TV phone 10 is equipped with the base section 11, a hand set 12 is arranged on the left-hand side of this base section 11, and the display supporter 13 is arranged in right-hand side.

[0008] The hand set 12 is equipped with the microphone and loudspeaker for talking over the telephone which it is and are not illustrated. A loudspeaker 14 and the various actuation keys 15 are arranged on the top face of the base section 11. The various actuation keys 15 of the menu screen key 157 grade on which menus, such as the loudspeaker sound-volume tongue 151 which adjusts the sound volume of a loudspeaker 14, the hand-set sound-volume tongue 152 which adjusts the sound volume of a hand set 12, the various function keys 153 accompanying a telephone function, the ten key 154 for dialing, the image transcription key 155 accompanying a television function, the privacy key 156, and various mode setting, are displayed as an actuation key 15 are arranged.

[0009] In the up transverse-plane side of the display supporter 13, the camera 16 which consisted of CCD is arranged and a speaker is photoed. Moreover, the display 17 which displays an image is attached.

in the hand-set 12 side side face of the display supporter 13. While the image of the partner transmitted from the TV phone of the message other party is displayed on this display 17 A menu screen is displayed according to the various modes specified by actuation of the actuation key 15. Moreover, the various displays of compounding the image which is photoed with a camera 16 and transmitted to the message other party with the image of the other party, displaying it, compounding with an image and displaying independently, further predetermined message sentence and icon (pictorial symbol) are performed.

[0010] In the posterior part side face of the base section 11, the VTR connection terminals 25a-25d for connecting VTR26 which is not illustrated are arranged. The camera exchange key 18 which switches VTR26 connected to this connection terminal 25 and the camera 16 attached in TV phone 10 is arranged at the right lateral of the display supporter 13. Moreover, the tongue 20 for color adjustment for adjusting the color (RGB) of the image displayed on the photography condition exchange key 19 which switches photography conditions, such as a diaphragm, to the right lateral of the display supporter 13 according to the brightness of the room photoed with a camera 16 etc., and a display 17, and the cap 21 are arranged at the position, respectively. Cap 21 is for covering the screw (not shown) for fixing a display 17 to the display supporter 13. In addition, the display 17 is attached in the vertical vertical direction free [rotation] centering on the core of this cap 21 according to the energization force to display supporter 13 direction by the spring.

[0011] Drawing 2 displays the outline configuration of the circuit of such a TV phone. The TV phone is equipped with the central-process section 31 as shown in this drawing 2 . This central-process section 31 is equipped with the memory 312 which consists of RAM (random access memory) as a working memory which stores ROM (read only memory) in which the various programs and data for CPU (central processing unit)311 of the common knowledge which performs various control, and a communication link were stored, and various data. Various data, such as various flags which show the telephone number of the partner who can receive a message in the incoming-call-barring mode in which the arrival of those other than the addresser who is set up by actuation of a function key 153 and a ten key 154, for example, specified is restricted, and the condition of abbreviated dialing and waiting, under dispatch and arrival, and the communication link middle class, are stored in this RAM. Moreover, the central-process section 31 is equipped with the key controller 314 which controls the indication signal inputted from the chip set 313 as a communication link interface, and the various keys of the actuation key 15.

[0012] The communications control section 33 and the image-processing section 34 are connected to this central-process section 31 through the bus lines (ISA Bus) 32, such as a data bus. Moreover, through this ISA Bus 32, it could connect with various information processors, such as a personal computer, and CAD (computer aided design), DTP (desktop publishing), and has come. The communications control section 33 is equipped with the ISDN-connection terminal 331, and is connected with the ISDN circuit. This communications control section 33 controls transmission and reception of a communications control signal, voice data, image data, etc. of data. The image-processing section 34 is equipped with the picture compression section 342 which carries out compression processing in order to transmit the image reconstruction section 341 which reproduces the image data [finishing / compression] transmitted from a message partner's TV phone through the communications control section 33, and the image data supplied from a camera 16 or VTR26 in the communications control section 33.

[0013] TV phone 10 is equipped with the audio control section 38 connected to the D/A (digital/analog) transducer 36 further connected with the image-processing section 34, the image composition section 37 connected to this D/A transducer 36, and this image composition section and the communications control section 33. The voice-input/output terminals 25a and 25c and chip set 313 of a hand set 12, a loudspeaker 14, and the VTR connection terminal 25 are making it connect with the audio control section 38. This audio control section 38 performs volume control of an audio change, tone on hold, DTMF (dual tone multiplex frequency), a loudspeaker 14, and a hand set 12.

[0014] The D/A transducer 36 is equipped with the D/A section 361 which changes into the video signal

(NTSC;national television system committee) of an analog the image data reproduced in the image reconstruction section 341 of the image-processing section 34 from a digital signal, and the A/D section 362 which changes into digital image data the video signal of the analog supplied from the image composition section 37. The digital image data changed in the A/D section 362 is supplied to the picture compression section 342 of the image-processing section 34.

[0015] The image composition section 37 is equipped with amplifier (AMP) 371, the picture Inn picture section 372, AMP373, and the change-over-switch section 374, and is connected with the image input/output terminals 25b and 25d of the VTR connection terminal 25, and a display 17. AMP371 amplifies the video signal of the analog photoed with the camera 16, or the video signal of the analog supplied from VTR26 through VTR connection terminal 25b. It opts for selection of both video signals according to the connection condition of the change-over-switch section 374 by change-over actuation of the camera exchange key 18 in drawing 1. The video signal of the analog amplified by this AMP371 is usually supplied to the A/D section 362, and when actuation assignment of the image composition function is carried out by the actuation key 15, it is supplied to the both sides of the A/D section 362 and the picture Inn picture section 372.

[0016] The picture Inn picture section 372 supplies the image data supplied from the D/A section 361 to AMP373. Moreover, when the actuation assignment of the image composition function is carried out by the actuation key 15, the video signal (signal of the image transmitted from the TV phone of the message other party) supplied from the D/A section 361 and the video signal (signal of the image supplied from the self-portrait or VTR26 photoed with a camera 16) which are supplied from AMP371 compound according to the assignment condition of the actuation key 15, and the video signal after composition supplies to AMP 373. AMP373 amplifies the supplied NTSC signal and supplies it to a display 17. A display 17 carries out color display of the supplied video signal.

[0017] Drawing 3 expresses the circuitry in the image-processing section 34. As shown in this drawing 3, the image reconstruction section 341 of the image-processing section 34 FIFO memory341a of FIFO with which the image data supplied from ISA Bus 32 is stored, Huffman decryption section 341b which carries out the Huffman decryption of the image data of this FIFO memory 341a, The image data stored in block memory 341c in which the image data after a decryption is stored, and block memory 341c was read, and it has 341d of compression playback sections which reproduce the image data compressed by motion compensation inter-frame prediction, DCT, etc.

[0018] From the area (area where the image data of the frame in front of one is stored) of the direction which is not the area where it has the area for two frames, the image data by which the Huffman decryption was carried out by turns is stored, and this image data is stored, image data is read and compression playback of the block memory 341c is carried out. And when the image transcription key 155 (drawing 1) is pressed, the image data into which it was compressed before the playback stored in this block memory 341c is supplied to the central-process section 31 through ISA Bus 32, and is stored in RAM of memory 312.

[0019] On the other hand, the picture compression section 342 is equipped with 342d of Huffman coding sections and buffer memory 342a which carry out Huffman coding of compression zone 342c which compresses the image data stored in active-parameter storage section 342a in which the parameter for setting up image quality is stored, block memory 342b in which the digital image data supplied from the D/A transducer 36 is stored, and this block memory 342b by motion compensation inter-frame prediction, DCT, etc., and the compressed image data further. It connects with CPU311 through ISA Bus 32, when a message person specifies image quality, each parameter specified by the message person or the other party speaker is memorized, and by the directions from CPU311, automatically, it sets up and active-parameter storage section 342a is changed.

[0020] Next, actuation of the example constituted in this way is explained. First, the normal operation of a TV phone is explained.

(1) Drawing 4 of a main routine of operation expresses actuation of a main routine. First, the main actuation of a main routine is explained. That is, in a main routine, CPU311 shifts to the next processing or former processing by detecting each condition FG (flag) of memory 312, performing each processing,

and changing the predetermined condition FG in the processing. That is, if dispatch or arrival is supervised and dispatch or arrival is detected, after changing predetermined FG by repeating waiting processing, it usually shifts to applicable processing. In dispatch and arrival-of-the-mail processing, if normal processing is performed, it will shift to processing during a communication link. And when processing was completed during the communication link, or when specific actuation etc. is made in arrival of the mail and dispatch processing, it returns to waiting processing and dispatch or arrival is supervised again.

[0021] Next, the detail of a main routine is explained according to drawing 4. That is, initialization and initial setting of various memory areas are performed about an ISDN board (communications control section 33), an image-processing board (image-processing section 34), a keyboard (actuation key 15), and an image composition board (picture Inn picture section 372) at the time of installation of TV phone 10 etc. (step 10). And if a function key 153 and the actuation key of ten key 154 grade are processed by the operator of a TV phone (step 11), CPU311 will shift to DI/O processing and will receive the output of the control signal to each board, and supply of the condition signal from each board (step 12).

[0022] And CPU311 accesses the flag storing field of RAM in memory 312, checks whether one of flags is in ON condition, and outputs the indication signal to the activation of processing and the predetermined part corresponding to the flag of ON condition. that is, CPU 311 is waiting -- when it shifts to processing during arrival of the mail when it shifts to processing during dispatch when it shifts to waiting processing when FG is ON (step 13) (step 14), and FG is ON during dispatch (step 15) (step 16), and FG is ON during arrival of the mail (step 17) (step 18), and FG is ON during a communication link (step 19), it shifts to processing during a communication link (step 20). And when all flags are OFF, and after either of the processings from step 14 to step 20 is completed, it returns to step 11 and processing is continued.

[0023] (2) Waiting processing drawing 5 expresses actuation of waiting processing. since the hand set 12 is supervising arrival of the mail and shifts to processing during arrival of the mail in a condition without OFF and a message of on hook one and a display 17 in with arrival of the mail (step 141;Y), the memory 312 of CPU311 is waiting -- while changing FG into an OFF condition from ON condition, FG is changed into ON condition from an OFF condition during arrival of the mail (step 142), and the return of the processing is carried out. This shifts to processing (step 18) during the arrival in drawing 4 henceforth. On the other hand, when there is no arrival of the mail (step 141; N), the condition of a hand set 12 is judged. if OFUFUKKU of a hand set 12 is detected (step 143;Y), since it will shift to processing during dispatch, the memory 312 of CPU311 is waiting -- while changing FG into an OFF condition from ON condition, Dispatch FG is changed into ON condition from an OFF condition (step 144). By this, it shifts to processing (step 16) during the dispatch in drawing 4 henceforth.

[0024] In step 143, a hand set 12 does not detect OFUFUKKU, but, in the case of a condition on hook (step 143; N), CPU311 judges whether the key input was carried out by actuation of the actuation key 15 (step 145), and when there is no key input, the return of (step 145; N) and the processing is carried out. A flag change for shifting to (step 146; Y) and step 144, when the key inputted on the other hand when a key input was carried out (step 145;Y) is the input of a loudspeaker key, and shifting to processing during dispatch is made. In this case, it is sent by the input of a loudspeaker key while on hook [of the hand set 12] had been carried out. When the inputted key is except a loudspeaker key (step 146; N), as each functional processing corresponding to the inputted key, a menu, a self-portrait, incoming call barring, etc. are set up (step 147), and the return of the processing is carried out.

[0025] (3) Dispatch processing drawing 6 expresses actuation of dispatch processing. As for this dispatch processing, processing is started in waiting processing of drawing 5 by what Dispatch FG is changed into ON condition for (step 144). In addition, since it is the same processing as the usual key telephone set, suppose that only the outline is explained. First, in a dispatch condition (step 161; N), when there is a dialing key input and 4 seconds have passed since 162;Y and this dialing key input (step 165;Y), when a function key is inputted and the numerical keypad of the double figures is inputted by abbreviated dialing before 4-second progress (step 167;Y), or when a dispatch key is inputted (step 168;Y), dispatch processing is performed. That is, while indicating that it is sending to a display 17 as

dispatch processing, an originating connection is processed by the communications control section 33 to an ISDN circuit network. Then, while changing Dispatch FG into an OFF condition from ON condition as condition FG modification processing, FG is changed into ON condition from an OFF condition during dispatch (step 170), and a condition is changed into a condition during dispatch from a dispatch condition.

[0026] On the other hand, in a dispatch condition (step 161; N), there is a dialing key input, 4 seconds have not passed (step 166; Y), and when it is not abbreviated dialing, or when it is the single figure also in abbreviated dialing, and when the dispatch key is not pressed (step 167; N, step 168; N), only input process of a dialing key is performed according to the inputted numerical keypad (step 171; Y) (step 172).

[0027] And in a dispatch condition (step 161; N), while it has been in a condition without a dialing key input, when 20 seconds pass (step 173; Y), dispatch time out treatment is performed (step 174). That is, as dispatch time out treatment, a display 17 is turned OFF and a loudspeaker 14 or the loudspeaker of a hand set 12 is switched to a busy tone (a two, a two, --) from a dial tone (two).

[0028] If FG is changed into ON condition during dispatch at step 170, it will supervise whether the connection response was done by the partner who shifted to step 175 and called to return processing from the ** step 161. When there is a response (step 175; Y), while changing FG into an OFF condition from ON condition during the dispatch set up at step 170, after changing FG into ON condition from an OFF condition during a communication link (step 176), it shifts to processing (step 20) during the communication link in drawing 4 henceforth by return processing. waiting, while turning OFF FG during dispatch on the other hand, when there is no response from a partner (step 175; N) and on hook [of the hand set 12 of an off-hook condition] is carried out (step 177; Y) -- FG is changed into ON condition (step 178), and it shifts to the waiting processing (step 14) in drawing 4 henceforth by return processing.

[0029] (4) Processing drawing 7 expresses actuation of processing during arrival of the mail during arrival of the mail. As for processing, in waiting processing of drawing 5, processing is started by what FG is changed into ON condition for during arrival of the mail (step 142) during this arrival. It judges whether CPU311 is incoming-call-barring mode by actuation of the actuation key 15 from the incoming call barring FG of memory 312 (step 181). When it is incoming-call-barring mode (step 181; Y), while setting the telephone number of the other party which carried out call origination as a and memorizing it, the incoming-call-barring registration number beforehand registered into memory 312 by actuation of the actuation key 15 is set as b (step 182).

[0030] And CPU311 compares the telephone number of a and b which were set up, and when in agreement with neither of the registration number b in which a partner's telephone number a which carried out call origination permits arrival of the mail (step 183; N), it performs cutting processing through the communications control section 33 to the other party which carried out call origination (step 184). then, waiting, while changing a flag into an OFF condition during arrival of the mail -- FG is changed into ON condition (step 185), and it shifts to the waiting processing (step 14) in drawing 4 henceforth by return processing.

[0031] On the other hand, while performing a call setup and sounding a ringer in incoming-call-barring mode if termination of arrival-of-the-mail processing is not directed (step 186; Y) when a call origination partner's telephone number a is in agreement with either of the registration numbers b (step 183; Y), or in not being in incoming-call-barring mode (step 181; N), arrival-of-the-mail processing of ending the message under arrival of the mail on a display 17 is performed (step 187). And if a hook switch is OFF (step 188; Y), the condition which can be talked over the telephone will be set up to an ISDN circuit through the communications control section 33 (step 189). Then, CPU311 changes FG into ON condition from an OFF condition during a communication link (step 190), and shifts to processing (step 20) during the message in drawing 4 henceforth by return processing while it changes FG into an OFF condition from ON condition during the arrival of memory 312.

[0032] (5) Processing drawing 8 expresses actuation of processing during a communication link during a communication link. during this communication link, in dispatch processing of drawing 6, as for

processing, FG is changed into ON condition during a communication link (step 176), or FG is changed into ON condition during a communication link in processing during the arrival of drawing 7 (step 190) -- especially therefore, processing is started. first, the other party which carried out call origination of CPU311 -- it supervises whether the demand of communication link cutting was given to the communications control section 33 through the ISDN circuit (step 201). When the hold key or the loudspeaker key is pressed beforehand (step 203;Y), even if a hand set 12 is on hook when there is no disconnect request (step 201; N) (step 202;Y), and a hold, a transmitting pause, etc. are talking over the telephone, each effective functional processing is performed (step 204).

[0033] That is, each following processing is made as each functional processing.

**** Hold processing** -- If a hold key is pressed among function keys 153, a hold screen will be displayed on a display 17 and hold screen data will be transmitted to an ISDN circuit from the communications control section 33. Hold screen data store in RAM of memory 312 the image data which was beforehand photoed with the camera 16 or was supplied from VTR26, and this image data is read and used for them. when a hold screen setting is a default (what is not preparation **** rewriting ** as standard), only the code of a hold is transmitted and the side which received the code displays a default screen on a display 17.

[0034] **** Transmitting pause processing** -- If a transmitting Pause key is chosen, while incorporating a screen without a front frame and a correlation and displaying on a display 17 from the image data supplied from camera 16 grade, the image data is transmitted to a message partner from the communications control section 33. Moreover, the icon which shows that it is in a pause condition is displayed on a display 17.

[0035] **** Privacy processing** -- If the privacy key 156 (drawing 1) is pressed, while transmitting a corresponding code to the message other party through the communications control section 33, the icon which shows that it is in a privacy condition is displayed on a display 17. On the other hand, in the TV phone which received the code of ply PASHI, a privacy screen is displayed on a display 17.

[0036] **** Image transcription processing** -- A push on the image transcription key 155 advances a demand so that the image data which does not have a correlation with a front frame to the TV phone of the message other party may be transmitted. And if image data without a correlation is received, it will be in a condition [having compressed the received image data], or the image data after playback by decryption etc. will be stored in RAM of memory 312, and an image transcription will be started. In addition, the compressed image data is reproduced, and after considering as the video signal of an analog in the D/A section 361 shown in drawing 2 , you may make it record on videotape on VTR26 through AMP373 and 25d of VTR connection terminals, when VTR26 is connected. In addition, since the image displayed on a display 17 is recorded on videotape as it is in this case, the correlation of the image data transmitted is not asked.

[0037] **** Menu processing** -- If the menu screen key 157 is pressed, the icon of image transcription medium selection will be displayed on a display 17, and the single shot image transcription which records the screen of only a certain specific frame on videotape, or selection of a tape will be attained. In a single shot image transcription, the Request to Send of image data without frame correlation is advanced by the other party TV phone, and if image data without a correlation is received, while the image data had been compressed, the data after playbacks, such as a decryption, are stored in memory 312.

[0038] **** Image processing** -- The outline is explained as mentioning later for details here. Selection of self-portrait processing displays the self-portrait picturized with not the image data transmitted to a display 17 from the other party TV phone but the camera 16, or VTR26 on a display 17. Looking at the self-portrait displayed on the display 17, a setup in a screen size or image quality mode is performed, and a message person makes a change. There are assignment image quality mode in which image data is transmitted by the specified fixed image quality, and automatic image quality mode which supervises a motion of image data and chooses the image quality of the suitable self-portrait according to a motion as this image quality mode. On the other hand, selection of a partner image processing displays a partner image-processing screen on some displays 17 on which the partner image is displayed. A message

person specifies the image quality mode of the screen size of a partner image, or a partner image according to directions of a partner image-processing screen, looking at the partner image displayed on this display 17. If the image quality mode of a partner image etc. is specified, CPU311 will transmit a corresponding control signal to the other party TV phone from the communications control section 33. In the TV phone of the other party, if this control signal is received, it will change into the specified image quality.

[0039] After each functional processing of ** to ** explained above is completed, image communications processing is performed (drawing 8 , step 205). That is, if an ISDN board (communications control section 33) will be in the condition of the data transmission O.K., image data will be incorporated, a communication link header will be attached for every transmitting block, and it will transmit from the communications control section 33. If received data are in the communications control section 33, it will receive and image data will be displayed on a display 17 for every image data for one frame through the image-processing section 34, the D/A transducer 36, and the image composition section 37. The received voice data is outputted to a hand set 12, a loudspeaker 14, or VTR connection terminal 25a through the audio control section 38.

[0040] In addition, in step 202, when a hand set 12 is in an off-hook condition (step 202; N), it judges whether the predetermined key input was carried out from the actuation key 15 (step 206). When a key input is carried out (step 206; Y), it shifts to each functional processing of step 204, and when a key input is not carried out (step 206; N), it shifts to pictorial communication processing of step 205.

[0041] On the other hand, in step 201, a disconnect request is advanced from the other party (step 201; Y), and when it is normal termination (step 207; Y), or when neither the hold key nor the loudspeaker key is beforehand pressed in step 203 (step 203; N), CPU311 performs a communication link post process (step 208). That is, if a release message is sent out to a voice circuit and release comes by the TV phone of the side which carried out on hook [of the hand set 12] on the contrary as a communication link post process, the release message of a data circuit is sent out. On the other hand, in the TV phone of the cut side, if an audio release message is received, the release message of data is sent out. Here, a tariff and duration of a call are displayed on the display 17 of an origination side, and only duration of a call is displayed on the display 17 of a receiving side.

[0042] then, its OFF condition is waiting while CPU311 changes FG into an OFF condition during the communication link of ON condition -- FG is changed into ON condition (step 209), and it shifts to the waiting processing (step 14) in drawing 4 henceforth by return processing. In step 207, like [when an error arises in an image data circuit], in not being normal termination, it performs (step 207; N) and communication link error processing (step 210). That is, as communication link error processing, the circuit of image data is cut and it considers only as voice communication. In this case, while displaying only the predetermined image beforehand stored in RAM, the purport which is a communication link error is displayed on a display 17.

[0043] Next, transceiver actuation of the image data under communications processing is explained, referring to drawing 2 and drawing 3 . After the video signal of the self-portrait photoed with the camera 16 or the image supplied from VTR26 is amplified by AMP371, it is supplied to the D/A transducer 36. Here, after the video signal of an analog is changed into image data digital in the A/D section 362, it is supplied to the image-processing section 34.

[0044] The image data supplied to the image-processing section 34 is stored in block memory 342b as subject-copy image data. In compression zone 342c, predetermined data are incorporated according to the parameter stored in active-parameter storage section 342a from the subject-copy image data stored in block memory 342b. And picture compression by motion compensation inter-frame prediction, DCT, etc. is performed to the incorporated image data. Huffman coding of the compressed image data is carried out further, and it is stored in buffer memory 342e one by one. The image data stored in this buffer memory 342e is incorporated by the central-process section 31 through ISA Bus 32, and is further transmitted to an ISDN circuit from the communications control section 33 through ISA Bus 32. It is reproduced with the TV phone of the message other party, and the transmitted image data is displayed on a display 17.

[0045] On the other hand, the image data from the other party TV phone which received in the communications control section 33 is supplied to the central-process section 31 through ISA Bus 32. Since compression processing is carried out with the other party TV phone, this image data is supplied to the image reconstruction section 341 one by one, in order to reproduce by the approach contrary to having compressed in the picture compression section 342. After the image data supplied to the image reconstruction section 341 is stored in FIFO memory 341a one by one and decrypted by Huffman decryption section 341b, it is stored in block memory 341c per frame. IDTC etc. is reproduced in 341d of compression playback sections, and the data stored in this block memory 341c are supplied to the D/A transducer 36. In addition, when the image transcription key 155 is pressed, the image data before the compression playback stored in block memory 341c is supplied to the central-process section 31 through ISA Bus 32, and is stored and saved at RAM of memory 312.

[0046] The digital image data supplied to the D/A transducer 36 is changed into the video signal of an analog in the D/A section 361, it is the picture Inn picture section 372, and is compounded with the video signal of the self-portrait supplied from camera 16 grade if needed etc., and is supplied and displayed on a display 17 through AMP373.

[0047] Next, the image quality of a self-portrait and a partner image and actuation of size change are explained. Image quality modification processing or size-change processing is performed to change the image quality of the image of oneself's or a partner, and size during a communication link. If image quality is lowered and size is made small, the amount of data per sheet becomes small, and per second, the frame number which can be transmitted will increase and will become close to an animation. On the contrary, if image quality is raised and size is enlarged, the amount of data per sheet will become large, and will become the coma delivery-display of a still picture. So, in this example, according to the application under communication link, image quality and size can be freely changed with a partner, and the optimal image which suited needs can be selected now to each other.

[0048] Drawing 9 is for explaining notionally each condition of image quality and size transform processing. Image quality and size conversion are performed by incorporating predetermined data according to the parameter stored in active-parameter storage section 342a from the subject-copy image data stored in block memory 342b. the state table of the subject-copy image data with which drawing 9 (a) is stored in block memory 342b -- it carries out. As shown in this drawing 9 (a), subject-copy image data consist of 153600 pixels each which consists of 640 dot x240 lines. And each pixel is 5-bit data about each of RGB (red, green, blue), and is eclipse ***** with gradation to 32 steps.

[0049] And it responds to the parameter set as active-parameter storage section 342a to this subject-copy image. The Rhine skip (drawing 9 (b)) which incorporates data at intervals of a line, the pixel skip which incorporates data at intervals of a pixel (drawing 9 (c)), The size assignment (drawing 9 (c)) which incorporates the data in the field surrounded in the specified start pixel and the pixel, the starting line, and the end line, and the transformer rate (drawing 9 (d)) which sets the pixel of subject-copy image data to two thirds, and incorporates it are performed. Moreover, image quality is changed also by modification of the various filter set points. That is, the hierarchy of the color of an incorporation image, the threshold value of whether to consider that it is the same when taking modification of the threshold value to color change and correlation of each block, etc. are changed.

[0050] Drawing 10 expresses actuation of an image processing. This image processing corresponds to the image processing in each functional processing (step 204) of processing during the communication link shown in drawing 8. CPU311 checks the image quality mode about a setup of the image quality of the image data transmitted and received, and when it is in assignment image quality mode (step 301; N), it judges which image quality of a partner image and a self-portrait is specified (step 302, step 303).

[0051] When changing the image quality of a partner image (step 302; Y), a partner image processing is performed (step 304). That is, a partner image-processing screen is displayed on some displays 17 on which the partner image is displayed. A message person specifies the screen size of a partner image, and the image quality of a partner image by setup of each parameter explained by drawing 9 according to directions of a partner image-processing screen, looking at the partner image displayed on this display 17. That is, modification of the Rhine skip, a pixel skip, size assignment, a transformer rate, and the

various filter set points etc. is specified, and the image quality of a partner image is specified. If each parameter of a partner image is specified, CPU311 will be transmitted to the other party TV phone from the communications control section 33. The central-process section 31 of the TV phone of the other party is changed into the parameter which had active-parameter storage section 342a (drawing 3) specified, and compresses image data by compression zone 342c henceforth according to the parameter after modification.

[0052] On the other hand, when modification of the image quality of a self-portrait is specified (step 303;Y), self-drawing processing is performed (step 305). That is, the self-portrait picturized with the camera 16 or VTR26 is displayed on the display 17 which showed the other party image. A message person sets up each parameter, such as the Rhine skip, looking at the self-portrait displayed on the display 17. Each set-up parameter is stored in active-parameter storage section 342a. Henceforth, according to this parameter, compression zone 342c incorporates the image data of block memory 342b, and performs compression processing.

[0053] In step 301, when automatic image quality mode is set up (step 301;Y), CPU311 performs automatic image quality processing (step 306). It is based on the principle of automatic image quality processing **** in automatic image quality mode. Namely, when compression processing is carried out, data of one frame are incorporated from a subject-copy image, and data size is small, it is judged as an image with few motions, and each parameter is changed in the direction which raises image quality. On the contrary, when the data size after compression processing becomes large, a parameter is changed in the direction in which image quality is reduced.

[0054] In this case, if image data is communicated by one ISDN circuit of 64K[bits-per-second] for example, the data communication of maximum 8K [bytes per second] is possible. Generally, in order to display in animation, the image display of 4-8 per second is required, and it is necessary to carry out the amount of transmit data per frame within 1-2K [a cutting tool]. At this example, an automatic change of the parameter is made so that image quality may be raised, if the amount of data is below 1K [a cutting tool], and if it is more than 2K [a cutting tool], it will become possible by making an automatic change of the parameter to always bring close to the transfer rate of 4-8 per second so that image quality may be reduced.

[0055] Drawing 11 expresses the image quality modification actuation in automatic image quality mode. From the subject-copy image of block memory 342b, according to the parameter stored in current setting parameter storage section 342a, CPU311 incorporates data of one frame (step 311), and judges compressed data size (step 312). Since it can judge that it is an image with few motions when compressed data size is below 1K [a cutting tool], the parameter stored in the present active-parameter storage section 342a is read (step 313). And each parameter is changed in the direction (direction put close to a subject-copy image) which raises image quality rather than the time of compression with the read parameter (step 314).

[0056] On the other hand, when compressed data size becomes large and exceeds 2K[cutting tool], it can be judged as an image with many motions. In this case, since the frame number which can be transmitted to per second will decrease and it will become an unnatural piece delivery animation if picture compression is carried out and it transmits according to the present parameter, the present active parameter is read (step 315) and each parameter is changed in the direction in which image quality is reduced (step 316). In addition, the image quality with the highest relation between image quality and a parameter is a subject-copy image, and turns OFF the whole of each parameter in this case. And in making image quality low, when each parameter combines, it sets it as predetermined image quality.

[0057] In step 312, when compressed data sizes are 1-2K [a cutting tool], while it has been the present parameter, picture compression is performed, and a motion of an image is succeedingly supervised by return processing.

[0058] Although the example explained above explained DCT to the example as compression processing of the image data based on the image-processing section 34, in this invention, it is not limited to this approach, and slope coding, vector quantization, motion compensation interframe coding, predicting coding, hierarchy vector quantization, and FST (Four Square Transform) are used, for

example, it is good also as these compression processings that constructed and combined **.

[0058]

[Effect of the Invention] Since according to the TV phone according to claim 1 the image quality transmitted to a message partner is set up and changed with the parameter setup means, suitable image quality can be chosen according to the image data (static images, such as a drawing, and large self-portrait of a motion) which a message person transmits. Since according to the TV phone according to claim 2 the parameter which incorporates image data is automatically changed so that a motion of image data may be judged by the compression image amount of data and it may become the suitable image quality according to a motion further, a screen display of the animation of a natural motion can be carried out.

[Translation done.]

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the appearance block diagram of the TV phone in one example of this invention.

[Drawing 2] They are the same as the above and the circuitry Fig. of a TV phone.

[Drawing 3] It is the block diagram showing the detail of the same as the above and the image-processing section.

[Drawing 4] They are the same as the above and the flow chart which shows actuation of the main routine of a TV phone.

[Drawing 5] They are the same as the above and the flow chart which shows actuation of waiting processing of a TV phone.

[Drawing 6] It is the flow chart which shows actuation of the same as the above and dispatch processing of a TV phone.

[Drawing 7] It is the flow chart which shows actuation of processing during the same as the above and the arrival of a TV phone.

[Drawing 8] It is the flow chart which shows actuation of processing during the same as the above and the communication link of a TV phone.

[Drawing 9] It is the explanatory view showing notionally each condition of the image quality of the same as the above and a TV phone, and size transform processing.

[Drawing 10] They are the same as the above and the flow chart which shows actuation of the image processing of a TV phone.

[Drawing 11] It is the flow chart which shows the image quality modification actuation in the same as the above and the automatic image quality mode of a TV phone.

[Description of Notations]

10 TV Phone

11 Base Section

12 Hand Set

13 Display Supporter

14 Loudspeaker

15 Actuation Key

16 Camera

17 Display

18 Camera Exchange Key

19 Photography Condition Exchange Key

20 Tongue for Color Adjustment

21 Cap

25 VTR Connection Terminal

31 Central-Process Section

311 CPU

312 Memory

32 ISA Bus
33 Communications Control Section
34 Image-Processing Section
341 Image Reconstruction Section
342a FIFO memory
342b Huffman coding section
342c Block memory
342d Compression playback section
342 Picture Compression Section
342a Active-parameter storage section
342b Block memory
342c Compression zone
342d Huffman coding section
342e Buffer memory
36 D/A Transducer
37 Image Composition Section
38 Audio Control Section

[Translation done.]

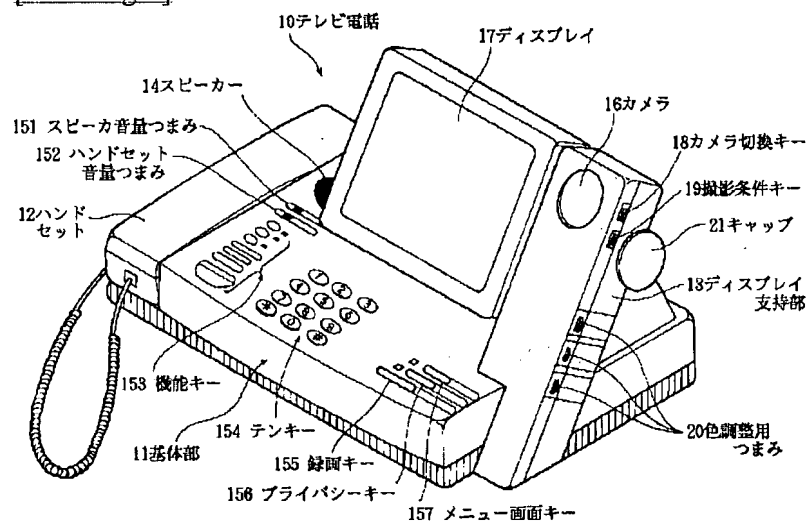
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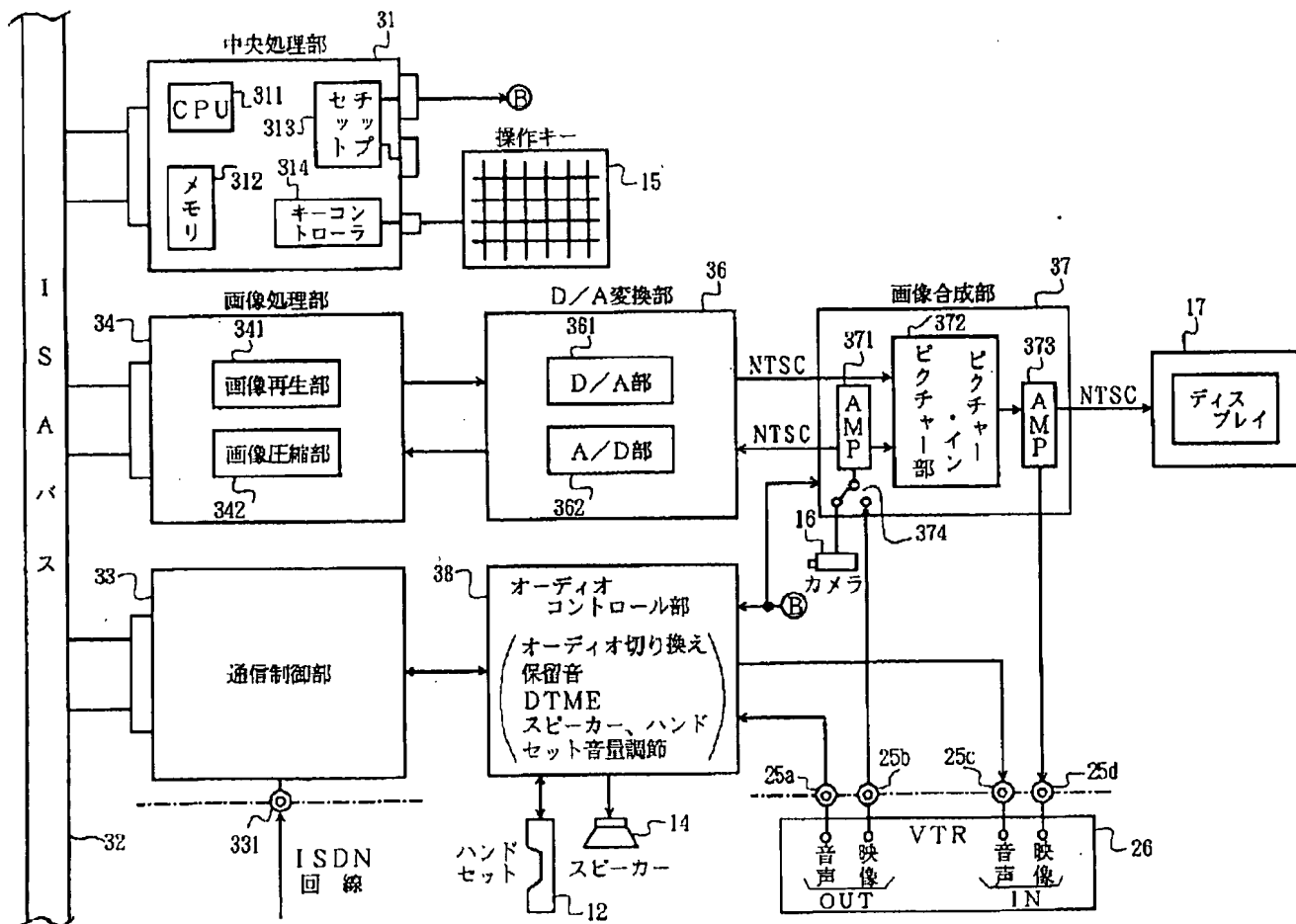
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DRAWINGS

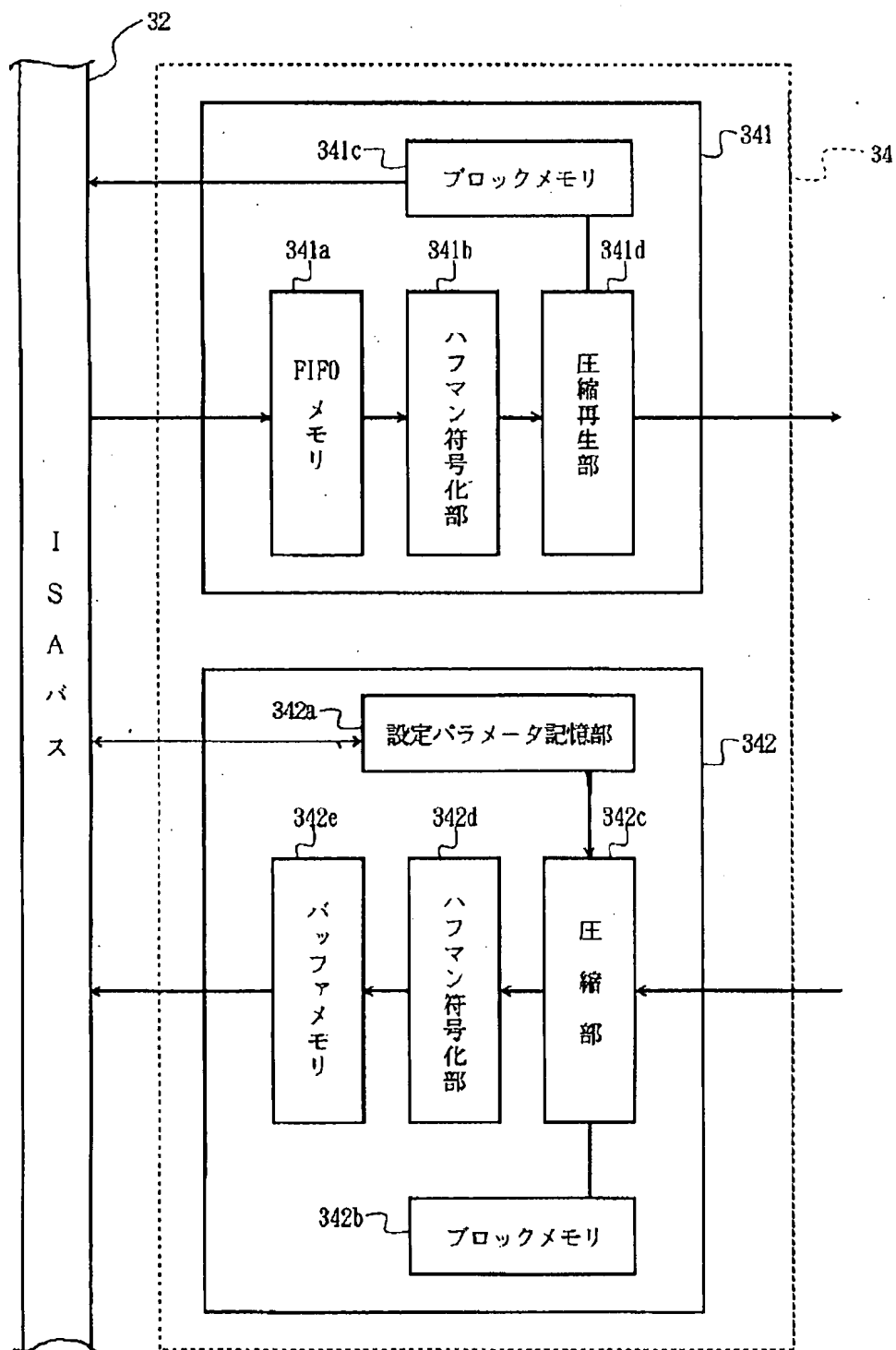
[Drawing 1]



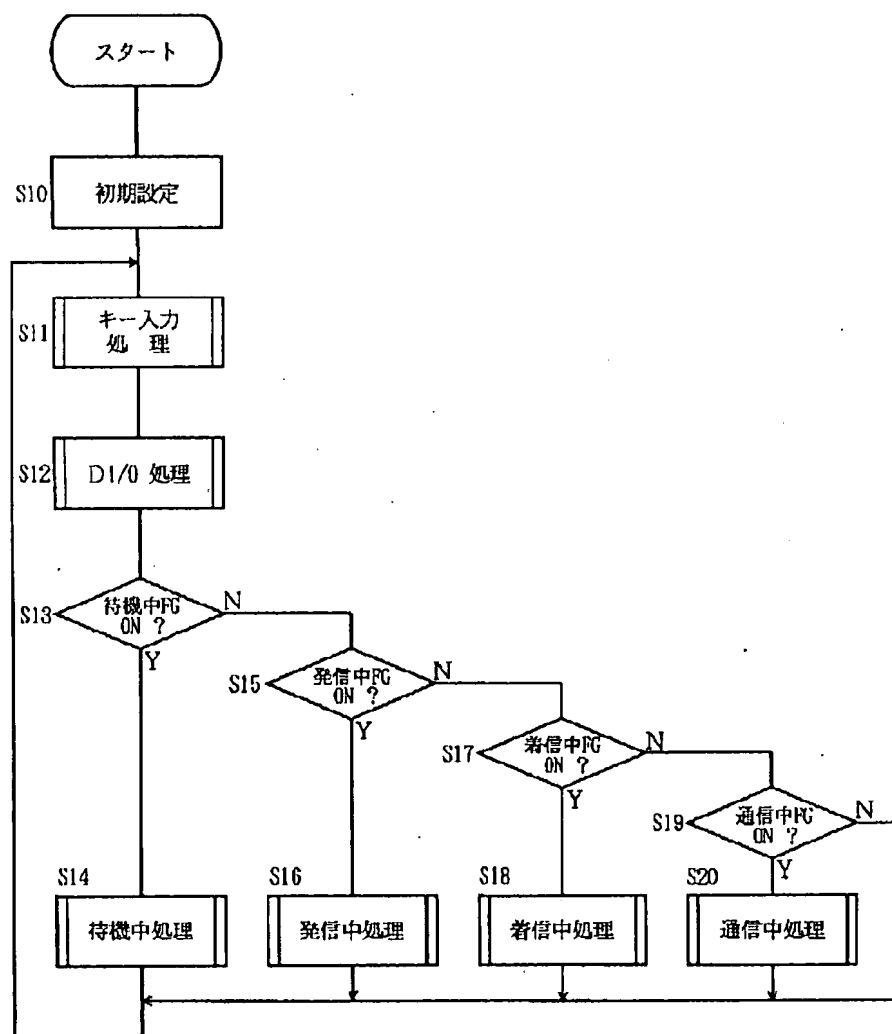
[Drawing 2]



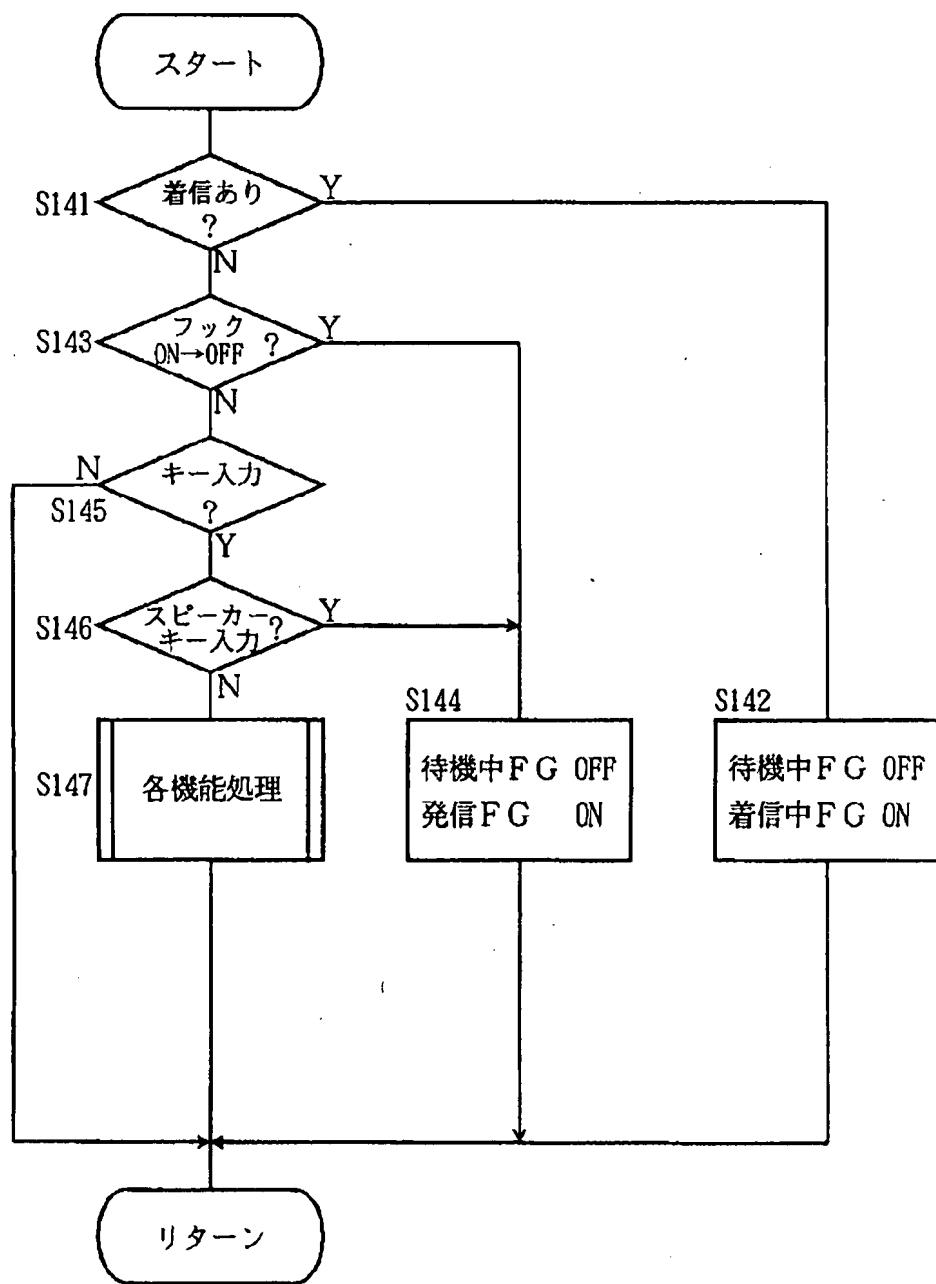
[Drawing 3]



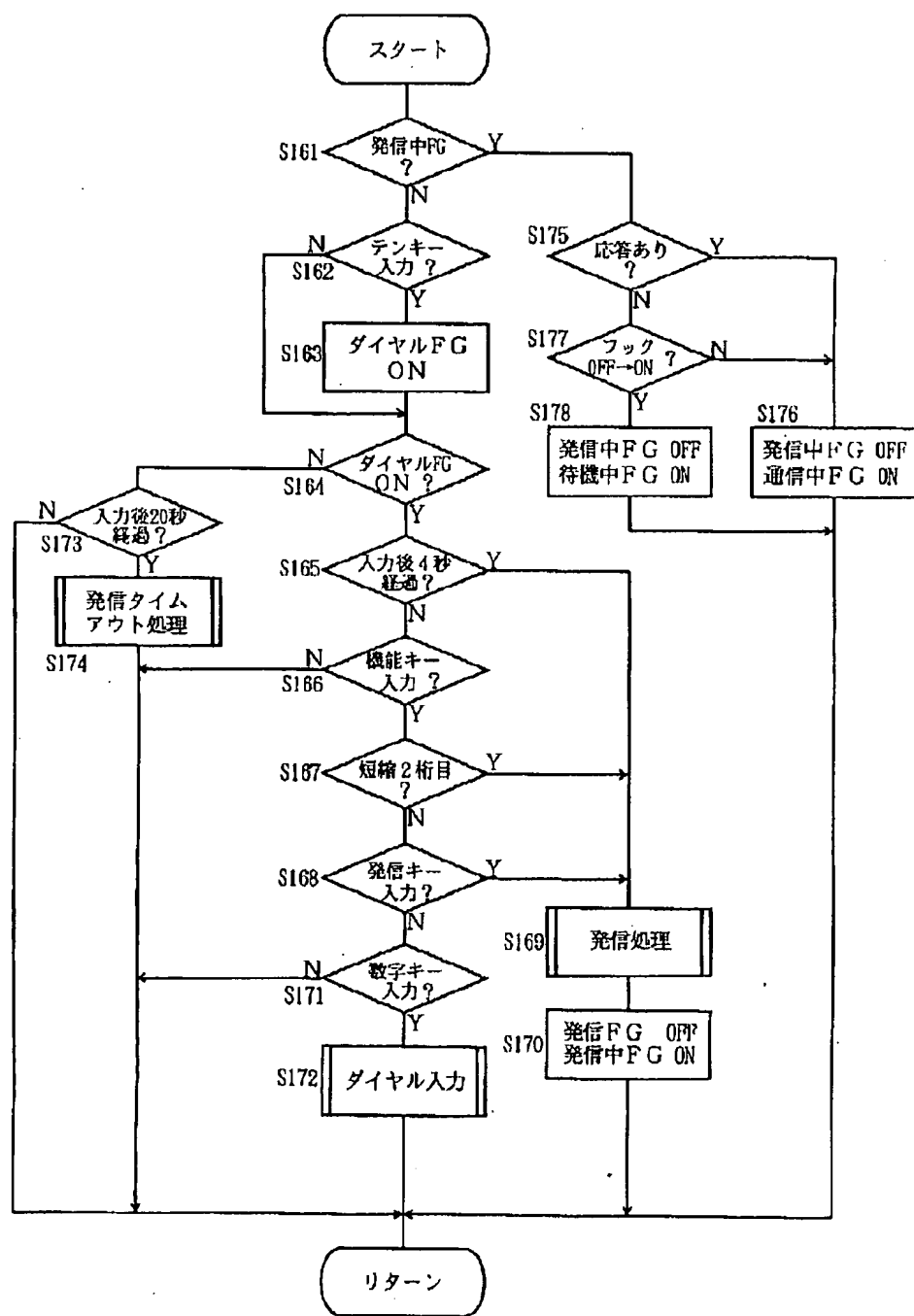
[Drawing 4]



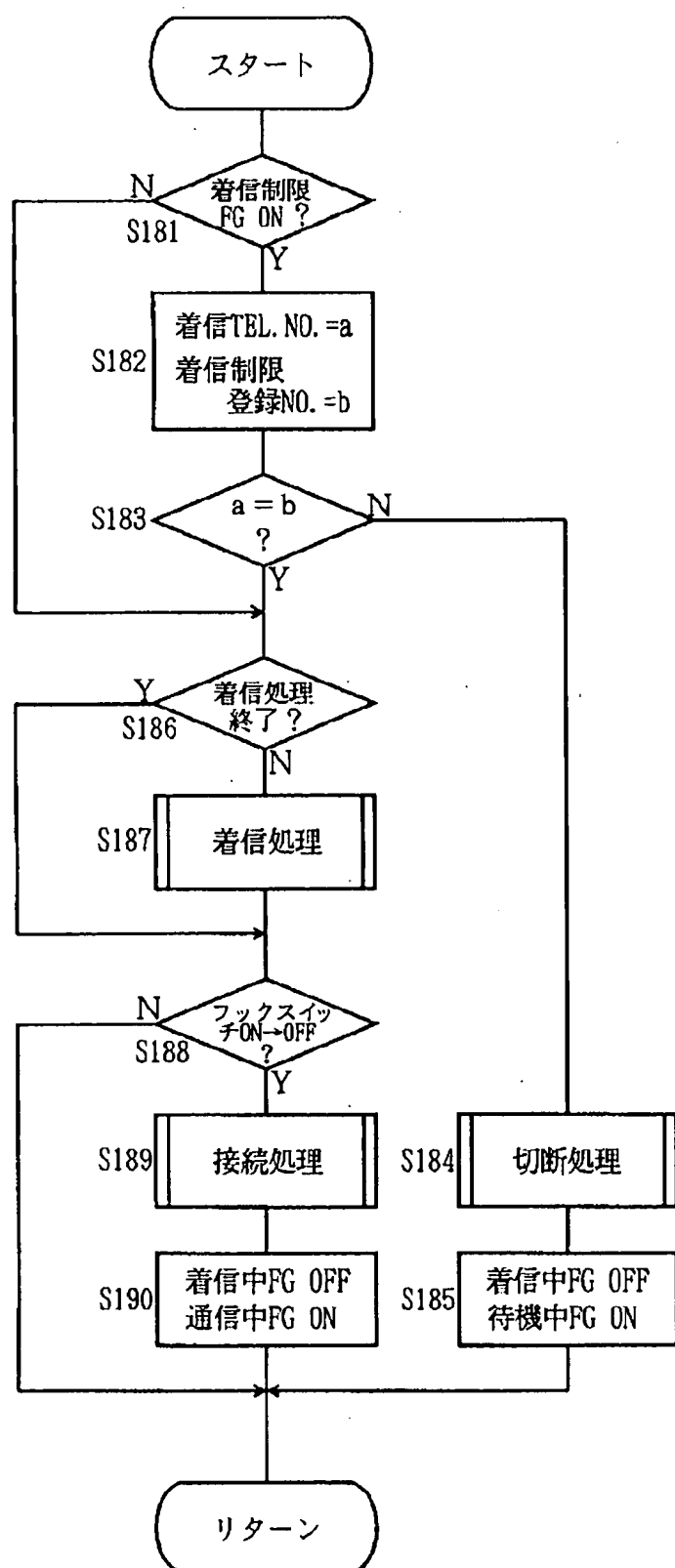
[Drawing 5]



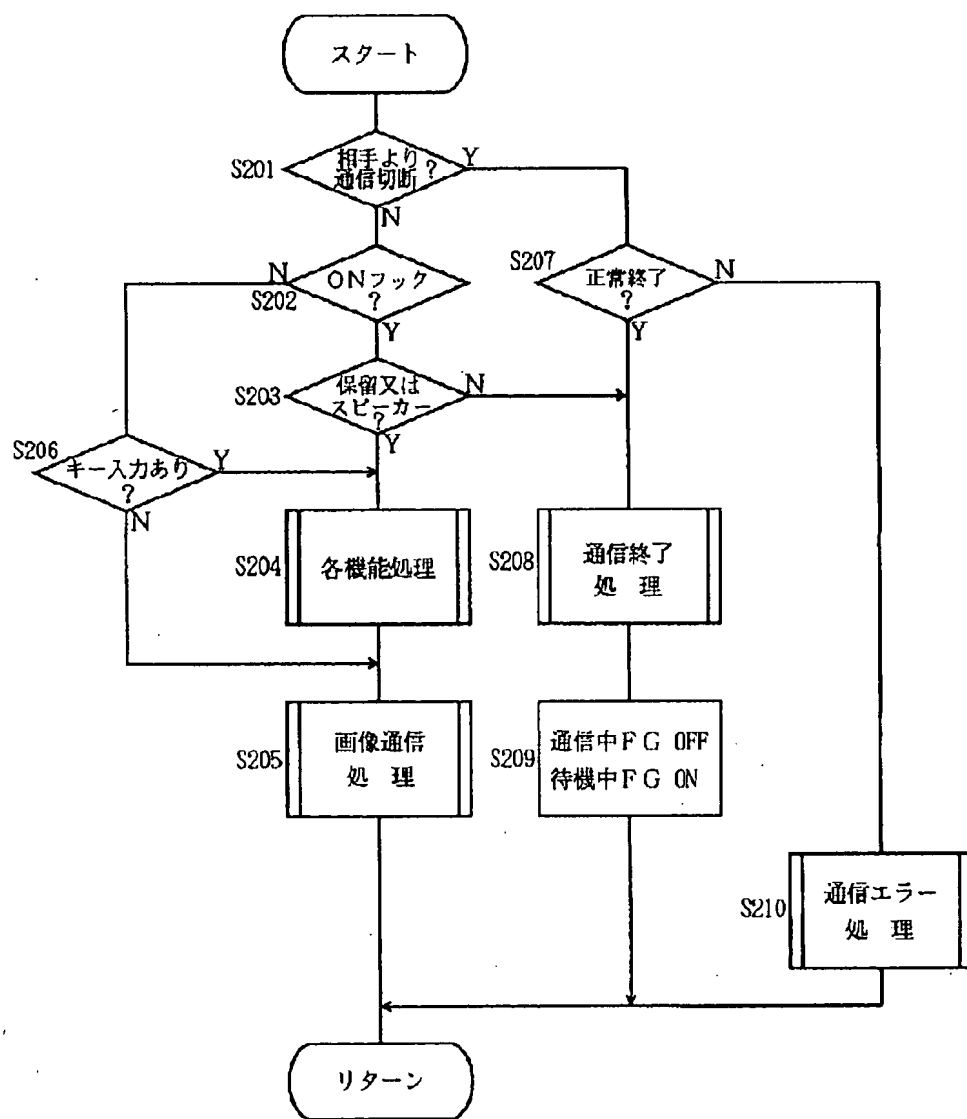
[Drawing 6]



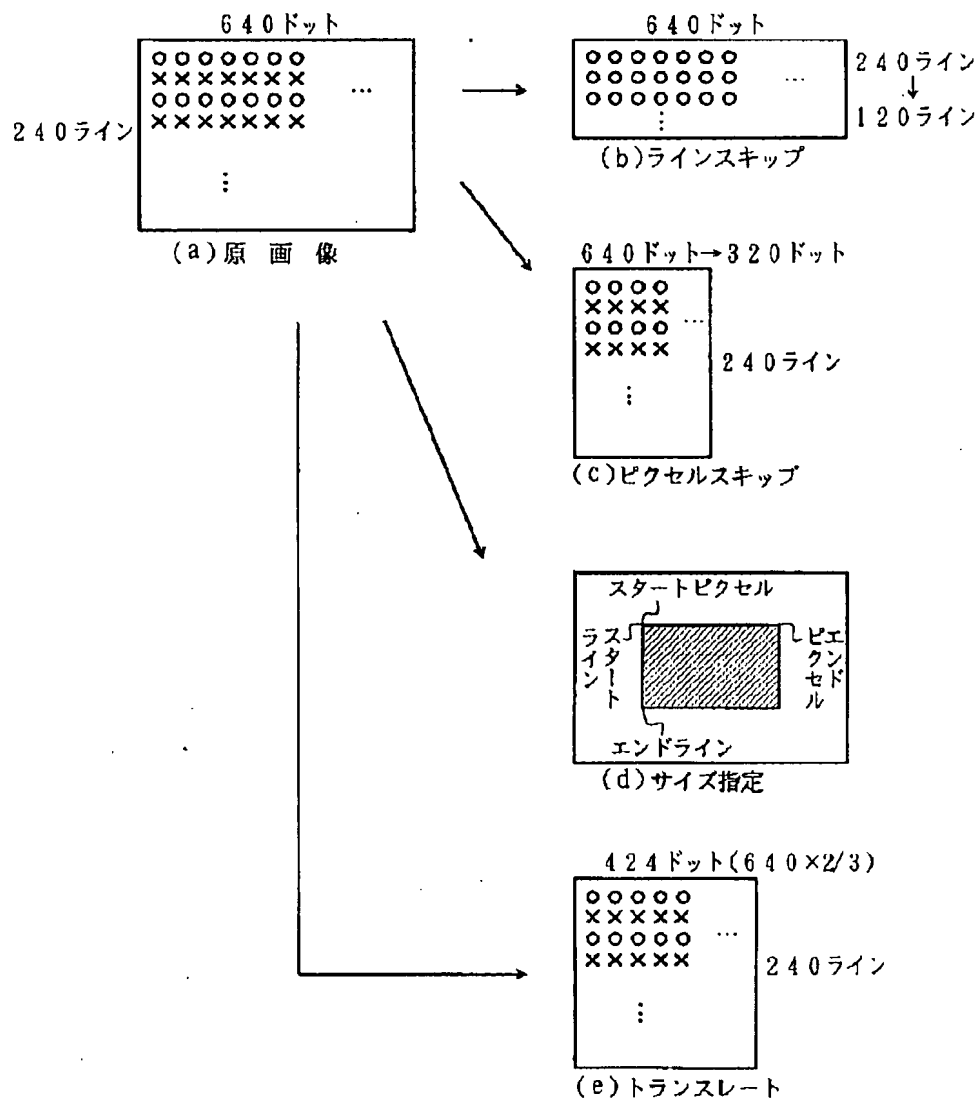
[Drawing 7]



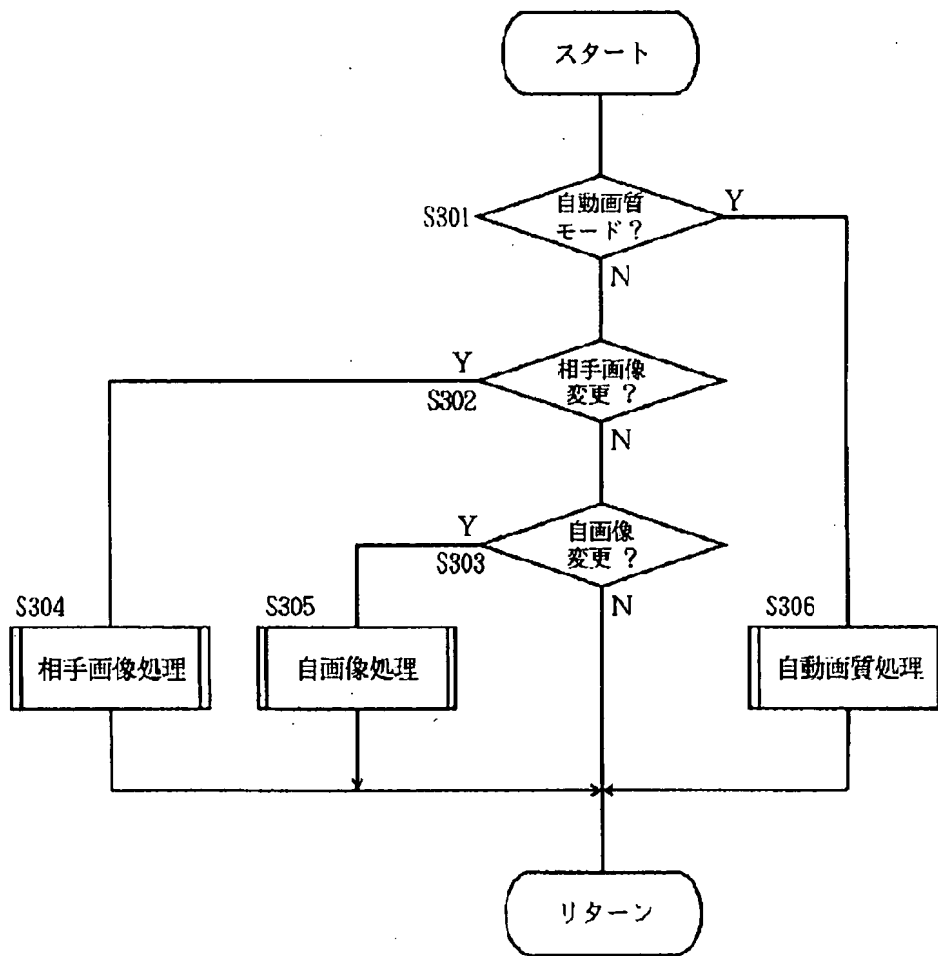
[Drawing 8]



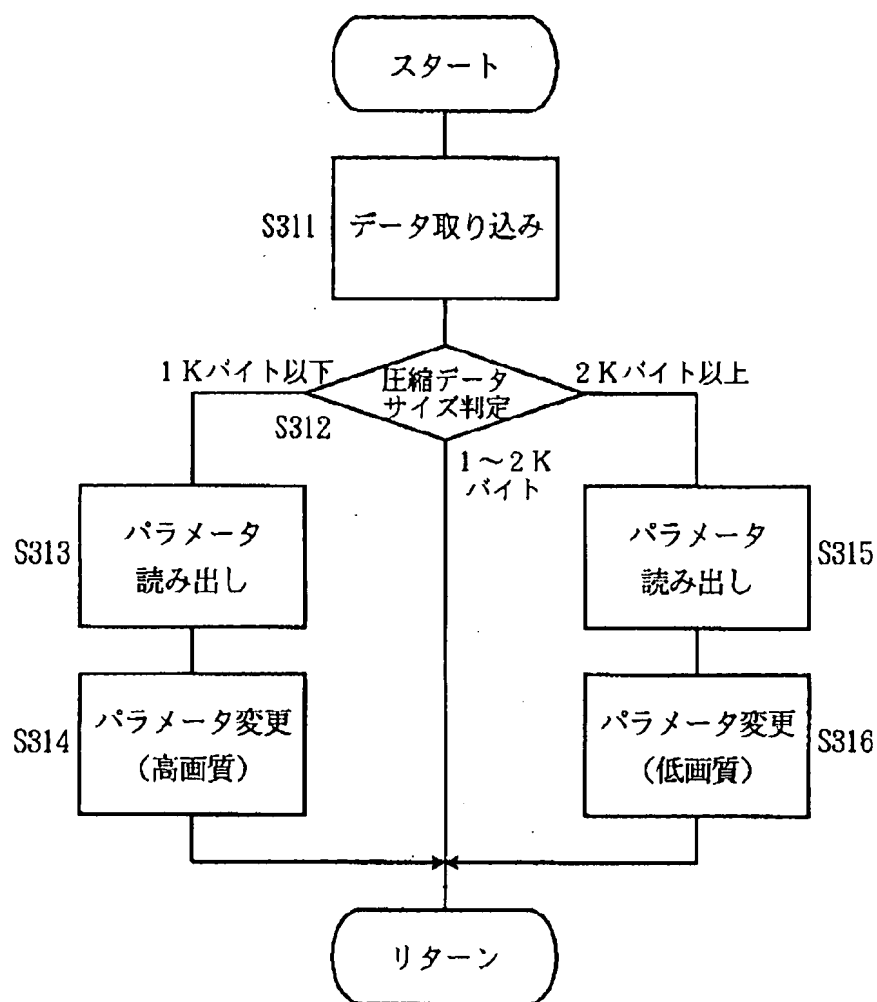
[Drawing 9]



[Drawing 10]



[Drawing 11]



[Translation done.]